PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-181417
(43)Date of publication of application : 26.06.2002

(51)Int.Cl. F25B 45/00
F25B 1/00
F25B 43/02

(21)Application number : 2000-382887
(22)Date of filing : 15.12.2000

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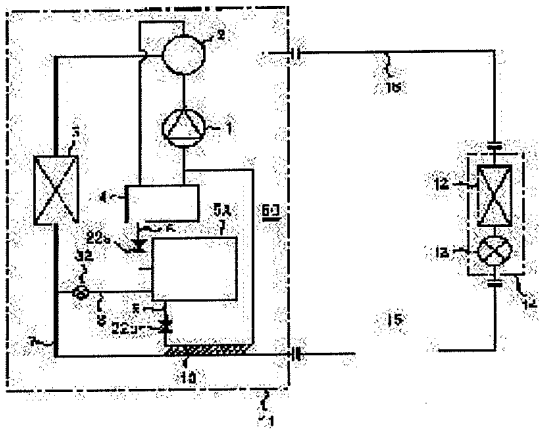
(54) APPARATUS AND OPERATION METHOD FOR REFRIGERATING CYCLE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an apparatus and method, in which an existing refrigerating-cycle apparatus is renewed into an apparatus using a new refrigerant, a lubricating oil in the old equipment is recovered to operate the refrigerating cycle.
SOLUTION: An extension pipe, which has been used in the refrigerating apparatus using chlorofluorocarbon or hydrochlorofluorocarbon refrigerant is used as an extension piping of a refrigerating-cycle using a hydrofluorocarbon refrigerant. In the refrigerating-cycle apparatus, an accumulation means is provided, in which, while the refrigerating-cycle operation is being conducted, mineral oil residue in the extension piping is continuously accumulated in a part of the refrigerator circuit.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] Extended piping which was being used for the refrigerating cycle equipment using the first refrigerant and first lubricating oil, and/or a use side machine In the refrigerating cycle equipment used as extended piping of the refrigerating cycle equipment using the second refrigerant and second lubricating oil, and/or a use side machine Refrigerating cycle equipment characterized by having an are recording means to accumulate continuously said first lubricating oil which remained to said extended piping and/or a use side machine in the part in a refrigerant circuit, carrying out refrigerating cycle operation.

[Claim 2] Said are recording means is refrigerating cycle equipment according to claim 1 characterized by separating said first lubricating oil using the difference of the solubility to said second refrigerant of said first lubricating oil and said second lubricating oil.

[Claim 3] Said are recording means is refrigerating cycle equipment according to claim 1 characterized by separating said first lubricating oil using the adsorbent difference over the activated carbon of said first lubricating oil and said second lubricating oil.

[Claim 4] Said are recording means is refrigerating cycle equipment according to claim 1 characterized by separating said first lubricating oil using the demarcation membrane which can pass said first lubricating oil and cannot pass said second lubricating oil.

[Claim 5] Refrigerating cycle equipment according to claim 1 to 4 characterized by being installed in the location which said are recording means bypassed from the main coolant circuit of said refrigerating cycle equipment.

[Claim 6] Refrigerating cycle equipment according to claim 1 to 5 characterized by making it flow into said are recording means after said the first lubricating oil and said second lubricating oil flow into the pressurized container in the refrigerant circuit of said refrigerating cycle equipment.

[Claim 7] Refrigerating cycle equipment according to claim 6 characterized by said pressurized container being an accumulator.

[Claim 8] Refrigerating cycle equipment according to claim 1 to 7 to which said first lubricating oil is mineral oil or an alkylbenzene oil, and said first refrigerant is characterized by using ester oil or an ether oil as said second lubricating oil with a chlorofluorocarbon system refrigerant or a hydrochlorofluorocarbon system refrigerant, using a hydro fluorocarbon system refrigerant as said second refrigerant.

[Claim 9] The operating method of the refrigerating cycle equipment characterized by to accumulate continuously said first lubricating oil which remained to said extended piping and/or a use side machine in the part in a refrigerant circuit, using extended piping which was being used for the refrigerating cycle equipment using the first refrigerant and first lubricating oil,

and/or a use side machine as extended piping of the refrigerating cycle equipment using the second refrigerant and second lubricating oil, and/or a use side machine, and carrying out refrigerating cycle operation.
[Claim 10] The operating method of the refrigerating cycle equipment according to claim 9 characterized by making it separate said first lubricating oil from said first lubricating oil which flowed out of the pressurized container in the refrigerant circuit of said refrigerating cycle equipment, and said second lubricating oil.
[Claim 11] The operating method of the refrigerating cycle equipment according to claim 9 or 10 to which said first lubricating oil is mineral oil or an alkylbenzene oil, and said first refrigerant is characterized by using ester oil or an ether oil as said second lubricating oil with a chlorofluorocarbon system refrigerant or a hydrochlorofluorocarbon system refrigerant, using a hydro fluorocarbon system refrigerant as said second refrigerant.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the refrigerating cycle equipment which generally exchanges and uses a refrigerant. It is a thing about the refrigerating cycle equipment which exchanges and uses a chlorofluorocarbon (CFC) system refrigerant or a hydrochlorofluorocarbon (HCFC) system refrigerant for a hydro fluorocarbon (HFC) system refrigerant as an example. Heat souce is updated to the thing using a new HFC system refrigerant in more detail. Performing the usual refrigeration / air-conditioning operation without carrying out special washing operation for established extended piping used with the CFC system refrigerant or the HCFC system refrigerant, and/or a use side machine It is related with the refrigerating cycle equipment whose appropriation of established piping and/or a use side machine is enabled by accumulating the lubricating oil which remained to established piping and/or a use side machine in the part in a refrigerant circuit.
[0002]
[Description of the Prior Art] The block diagram of the refrigerating cycle equipment generally used conventionally is shown in drawing 5 . In drawing 5 , A is heat souce and builds in a compressor 33, a four way valve 34, the heat-source side heat exchanger 35, the 1st actuation valve 36, the 2nd actuation valve 37, and an accumulator 38. B is a use side machine and is equipped with the flow regulator 39 and the use side heat exchanger 40. The 1st connecting piping C and the 2nd connecting piping D connect, and heat souce A and the use side machine B form a refrigerating cycle. In addition, the use side machine B may be called an interior unit in an air conditioner etc.
[0003] The end of the 1st connecting piping C is connected with the heat-souce side heat exchanger 35 through the 1st actuation valve 36, and other ends of the 1st connecting piping C are connected with the flow regulator 39. The end of the 2nd connecting piping D is connected

through a four way valve 34 and the 2nd actuation valve 37, and other ends of the 2nd connecting piping D are connected with the use side heat exchanger 40. Moreover, oil returning hole 38a is prepared in the lower part of outflow piping of the shape of a U tube of an accumulator 38.

[0004] The flow of the refrigerant of this refrigerating cycle equipment is explained along with drawing 5 . A continuous-line arrow head shows the flow of a broken-line arrow head's heating operation of the flow of air conditioning operation among drawing 5 . First, the flow of air conditioning operation is explained. Through a four way valve 34, the gas refrigerant of elevated-temperature high pressure compressed with the compressor 33 flows into the heat-source side heat exchanger 35, and heat exchange of it is carried out to a medium here, and it is condensate-ized. The condensate-ized refrigerant flows into a flow regulator 39 through the 1st actuation valve 36 and the 1st connecting piping C, and it decompresses and will be in a low-pressure two phase condition, and by the use side heat exchanger 40, heat exchange of it is carried out to a use medium, and it is evaporative-gas-ized. The evaporative-gas-ized refrigerant returns to a compressor 33 through the 2nd connecting piping D, the 2nd actuation valve 37, a four way valve 35, and an accumulator 38.

[0005] Next, the flow of heating operation is explained. Through a four way valve 34, the 2nd actuation valve 37, and the 2nd connecting piping D, the gas refrigerant of elevated-temperature high pressure compressed with the compressor 33 flows into the use side heat exchanger 40, and heat exchange of it is carried out to a use medium, and it is condensate-ized. The condensate-ized refrigerant flows into a flow regulator 39, is decompressed, will be in a low-pressure two-phase condition, and through the 1st connecting piping C and the 1st actuation valve 36, by the heat-souce side heat exchanger 35, heat exchange of it is carried out to a medium, and it is evaporative-gas-ized. The evaporative-gas-ized refrigerant returns to a compressor 33 through a four way valve 34 and an accumulator 38.

[0006] Conventionally, with such refrigerating cycle equipment, although the CFC system refrigerant and the HCFC system refrigerant have been used, these refrigerants are the pans for production regulation for abolition in order to destroy an ozone layer. Refrigerating cycle equipment using the HFC system refrigerant as an alternative of these refrigerants is implementation-ized.

[0007] When the refrigerating cycle equipment using a CFC system refrigerant or a HCFC system refrigerant is superannuated, it is necessary to change to new refrigerating cycle equipment but, and since the CFC system refrigerant and the HCFC system refrigerant are set as the object of abolition and production regulation, it is necessary to change them to the refrigerating cycle equipment using different refrigerants, such as a HFC system refrigerant.

[0008] However, since the 1st connecting piping C which connects heat souce A and the use side machine B, the 2nd connecting piping D, and the use side machine B have a long available period and do not carry out superannuation compared with heat souce A, either, if it can be used as it is, exchange of refrigerating cycle equipment is possible for them in simple at low cost again.

[0009] However, in the connecting piping C which was being used with the refrigerating cycle equipment which used the CFC system refrigerant and the HCFC system refrigerant, and connecting piping D, mineral oil, an alkylbenzene oil, etc. which were used as a lubricating oil remain.

[0010] It mixes in the lubricating oil which extant mineral oil, an alkylbenzene oil, etc. will use with a HFC system refrigerant if it is in the condition to which the above-mentioned residue remained mostly in connecting piping C and connecting piping D, for example, the refrigerating cycle equipment using a HFC system refrigerant is connected and connecting piping C and connecting piping D are used, degradation of the lubricating oil for refrigerating cycle equipments using a HFC system refrigerant is promoted, and the dependability of the refrigerating cycle equipment using a HFC system refrigerant is spoiled.

[0011] For this reason, when the 1st connecting piping C which was being used with the refrigerating cycle equipment which used the CFC system refrigerant and the HCFC system refrigerant, the 2nd connecting piping D, and the use side machine B constituted the refrigerating

cycle equipment using a HFC system refrigerant and connecting piping C, connecting piping D, and the use side machine B were used conventionally, connecting piping C, connecting piping D, and the cleaning agent of dedication of the use side machine B needed to wash.
[0012] Moreover, drawing 6 is the conventional example of the established piping use approach given in JP,6-249551,A, it collects the mineral oil which remains in established piping, makes established piping available by retrofit, and is mainly aimed at a car air-conditioner. In the conventional example, first, it is filled up with a HFC system refrigerant after collecting a CFC system refrigerant and/or HCFC system refrigerants, and the eliminator 60 which consists of the bulbs 61, 62, and 63 illustrated by the dotted-line frame, a column 64, a drain 65, and an evaporator 66 is attached in a high tension side and a low-tension side service port, and where an eliminator 60 is isolated with the bulbs 61 and 63 closed, a refrigerator is operated. The lubricating oil for HFC system refrigerants which dissolved in the HFC system refrigerant and the HFC system refrigerant involves in the mineral oil which remained for established piping, and moves. After carrying out fixed time amount operation, open the bulb 61 to the column 64 made into the reduced pressure vacuum, move the HFC system refrigerant of the letter of the dissolution in the condition of having become cloudy, the lubricating oil for HFC system refrigerants, and mineral oil to a column 64, close a bulb 61, mineral oil is made to pile up in the lubricating oil for HFC system refrigerants which dissolved in the lower part at a HFC system refrigerant and it, and the upper part, and separation liquid separation is carried out. A lower HFC system refrigerant and the lubricating oil for HFC system refrigerants which dissolved in it open the bulb 63 to the evaporator 66 of an eliminator 60, viewing a column 64, and carries out restoration impregnation through a low-tension side service port by the vapor-liquid mixed state into a refrigerator system. Subsequently, a bulb 63 is shut, the bulb 62 to a drain is opened, and mineral oil is collected. By repeating this activity several times, mineral oil is collected out of the system of a refrigerating cycle, and established piping is made available.
[0013]
[Problem(s) to be Solved by the Invention] The approach of washing the connecting piping C shown in drawing 5 and connecting piping D with the cleaning agent of dedication had the trouble that the cost concerning washing was high while it is very complicated and required the long time. Moreover, when a cleaning agent remained, there was also a trouble that the dependability of refrigerating cycle equipment was lost.
[0014] Moreover, by the retrofit approach shown in drawing 6 , when established piping like a car air-conditioner is short Although the CFC system refrigerant in a system or the lubricating oil concentration for HCFC system refrigerants can be reduced by mixing the lubricating oil for the lubricating oil for a HFC system refrigerant and HFC system refrigerants, a CFC system refrigerant, or HCFC system refrigerants by short-time operation, and repeating washing several times In the long multi-air-conditioner for buildings of extended piping, and the refrigerator which uses various loads, such as a showcase, for a use side, and serves as a complicated refrigerant circuit, by short-time operation, a HFC system refrigerant, The lubricating oil for the lubricating oil for HFC system refrigerants, a CFC system refrigerant, or HCFC system refrigerants cannot be mixed, and lubricating oil concentration for a CFC system refrigerant or HCFC system refrigerants cannot be reduced easily. Moreover, since air-conditioning / refrigeration operation was carried out where a part of lubricating oil for a CFC system refrigerant or HCFC system refrigerants is mixed, by the time it mixed completely even if it applies for a long time and these are mixed completely, the dependability of a device may have been spoiled.
[0015] Furthermore, since visual observation of the up oil level in a column and the lower oil level was carried out and discharge recovery of the lubricating oil for a CFC system refrigerant or HCFC system refrigerants was carried out out of the system by bulb actuation, it was the activity which may re-flow out the upside lubricating oil for CFC system refrigerants, or the lubricating oil for HCFC system refrigerants in a refrigerant circuit by the operation mistake, and requires skill.
[0016]
[Means for Solving the Problem] It is made in order that this invention may solve this trouble. Refrigerating cycle equipment according to claim 1 Extended piping which was being used for the

refrigerating cycle equipment using the first refrigerant and first lubricating oil, and/or a use side machine In the refrigerating cycle equipment used as extended piping of the refrigerating cycle equipment using the second refrigerant and second lubricating oil, and/or a use side machine It has an are recording means to accumulate continuously said first lubricating oil which remained to said extended piping and/or a use side machine in the part in a refrigerant circuit, carrying out refrigerating cycle operation.

[0017] Moreover, the refrigerating cycle equipment by invention of claim 2 separates said first lubricating oil in the thing of claim 1 using the difference of solubility [as opposed to said second refrigerant of said first lubricating oil and said second lubricating oil in said are recording means].

[0018] Moreover, the refrigerating cycle equipment by invention according to claim 3 separates said first lubricating oil in the thing of claim 1 using an adsorbent difference [as opposed to the activated carbon of said first lubricating oil and said second lubricating oil in said are recording means].

[0019] Moreover, said are recording means separates said first lubricating oil using the demarcation membrane to which it can pass and the refrigerating cycle equipment by invention according to claim 4 cannot pass said second lubricating oil for said first lubricating oil in the thing of claim 1.

[0020] Moreover, the refrigerating cycle equipment by invention according to claim 5 is installed in the location which said are recording means bypassed from the main coolant circuit of said refrigerating cycle equipment in one thing of claims 1-4.

[0021] Moreover, after said the first lubricating oil and said second lubricating oil flow into the pressurized container in the refrigerant circuit of said refrigerating cycle equipment, it is made for the refrigerating cycle equipment by invention according to claim 6 to flow into said are recording means in one thing of claims 1-5.

[0022] Moreover, in the thing of claim 6, said pressurized container of the refrigerating cycle equipment by invention according to claim 7 is an accumulator.

[0023] Moreover, in one thing of claims 1-7, said first refrigerant is a chlorofluorocarbon system refrigerant or a hydrochlorofluorocarbon system refrigerant, said first lubricating oil is mineral oil or an alkylbenzene oil, and invention according to claim 8 uses ester oil or an ether oil as said second lubricating oil, using a hydro fluorocarbon system refrigerant as said second refrigerant.

[0024] Moreover, the operating method of the refrigerating cycle equipment by invention according to claim 9 Extended piping which was being used for the refrigerating cycle equipment using the first refrigerant and first lubricating oil, and/or a use side machine Said first lubricating oil which remained to said extended piping and/or a use side machine is continuously accumulated in the part in a refrigerant circuit, using as extended piping of the refrigerating cycle equipment using the second refrigerant and second lubricating oil, and/or a use side machine, and carrying out refrigerating cycle operation.

[0025] Moreover, it is made for the operating method of the refrigerating cycle equipment by invention according to claim 10 to separate said first lubricating oil from said first lubricating oil which flowed out of the pressurized container in the refrigerant circuit of said refrigerating cycle equipment, and said second lubricating oil in the approach of claim 10.

[0026] Moreover, in the approach of claims 9 or 10, said first refrigerant is a chlorofluorocarbon system refrigerant or a hydrochlorofluorocarbon system refrigerant, said first lubricating oil is mineral oil or an alkylbenzene oil, and ester oil or an ether oil is used for the operating method of the refrigerating cycle equipment by invention according to claim 11 as said second lubricating oil, using a hydro fluorocarbon system refrigerant as said second refrigerant.

[0027]

[Embodiment of the Invention] Gestalt 1. drawing 1 of operation is drawing showing the refrigerant circuit of refrigerating cycle equipment in which the lubricating oil are recording device by the gestalt 1 of operation of this invention was carried. For a compressor and 2, in drawing 1 , a four way valve and 3 are [1 / an accumulator and 5A of a heat-source side heat exchanger and 4] lubricating oil are recording means. The lower part of an accumulator 4 and lubricating oil are recording means 5A are connected by the interconnecting tube 6 through

valve 22a. An interconnecting tube 6 discharges the lubricating oil separated with the accumulator 4, and is made to flow into lubricating oil are recording means 5A. Moreover, an interconnecting tube 8 connects with a liquid tube 7 through a flow regulator 32, and lubricating oil are recording means 5A is connected with the inlet-port section of a compressor 1 by the excurrent canal 9 through valve 22b. 10 is a refrigerant heat exchanger and carries out heat exchange between the refrigerant which circulates an excurrent canal 9, and the refrigerant which circulates a liquid tube 7. The lubricating oil are recording device 50 is constituted including the interconnecting tube 6 connected to this focusing on lubricating oil are recording means 5A explained above, an interconnecting tube 8, an excurrent canal 9, Valves 22a and 22b, and a flow regulator 32. Moreover, the exterior unit 11 is formed including a compressor 1, a four way valve 2, the heat-source side heat exchanger 3, an accumulator 4, and lubricating oil are recording means 5A. Moreover, 12 is a use side heat exchanger, 13 is a flow regulator, and the use side machine 14 is formed of these. Further 15 is liquid extension piping and 16 is gas extension piping.

[0028] The liquid extension piping 15 which was being used with the first refrigerant and refrigerating cycle equipment using the HCFC system refrigerant or the CFC system refrigerant as an example, the gas extension piping 16, and the use side machine 14 are diverted, the second refrigerant and the exterior unit 11 using the HFC system refrigerant as an example are established newly, and actuation of air conditioning operation at the time of building the above refrigerating cycle equipments is explained. It passes through a four way valve 2, and heat is radiated by the heat-source side heat exchanger 3, it condenses and liquefies, and the hot and high-pressure gas refrigerant which breathed out the compressor 1 flows the liquid extension piping 15 through a liquid tube 7. Mineral oil remains as the first lubricating oil used for the liquid extension piping 15, the gas extension piping 16, and the use side machine 14 with the refrigerating cycle equipment of a HCFC system refrigerant or a CFC system refrigerant, and an example, and the liquid cooling intermediation which flows the liquid extension piping 15 pulls the mineral oil which remains according to the shearing force produced between liquid cooling intermediation and mineral oil, and flows with the shearing. The liquid cooling intermediation which flowed the liquid extension piping 15 goes into the use side machine 14, and evaporation evaporation is carried out, and the mineral oil which remained in the use side machine 14 is pulled, it flows into the gas extension piping 16 with a shearing, the mineral oil which remains for the gas extension piping 16 is pulled, it flows to an accumulator 4 through a four way valve 2 with a shearing, and it returns to a compressor 1. In this process, the second lubricating oil used with the HFC system refrigerant and a lubricating oil like ester oil as an example are breathed out from a compressor 1, circulate through under refrigerant piping with a HFC system refrigerant, are mixed with the mineral oil which remained in established piping, and flow into an accumulator 4 with a refrigerant.

[0029] Next, the actuation at the time of carrying out heating operation is explained. The hot and high-pressure gas refrigerant which breathed out the compressor 1 flows the gas extension piping 16 through a four way valve 2. At this time, the mineral oil which remains for the gas extension piping 16 is pulled to a gas refrigerant, flows with ******, goes into the use side heat exchanger 12, radiates heat here, and it liquefies and it will be in the two phase condition of rat tail low voltage with a flow regulator 13 with condensation and the mineral oil which remained in the use side heat exchanger 12. This low-pressure two phase refrigerant and mineral oil flow the liquid extension piping 15, pull the mineral oil which remains in the liquid extension piping 15, flow with a shearing, go into an exterior unit 11, evaporate in the heat-source side heat exchanger 3, flow into an accumulator 4 through a four way valve 2, and return to a compressor 1. In this process, the ester oil carried out from the compressor 1 circulates through the inside of established refrigerant piping with a refrigerant, is mixed with the mineral oil which remained in established piping, and flows into an accumulator 4 with a refrigerant.

[0030] Next, lubricating oil are recording means 5A is explained. Lubricating oil are recording means 5A has the structure shown in drawing 2 , and the isolation region 18 and the are recording field 19 bisect the interior of the processing tub 5 with the diaphragm 17. The diaphragm 17 is stopped in fixed height and the field on either side is opening the upper part for

free passage. In order to accumulate the mineral oil collected from established piping into a refrigerant circuit, the mineral oil and ester oil which flowed into the accumulator 4 are led to the isolation region 18 of lubricating oil are recording means 5A via an interconnecting tube 6. Moreover, from an interconnecting tube 8, the liquid cooling intermediation extracted to low voltage by the flow regulator 32 flows, it separates into a two phase from the soluble difference of mineral oil, ester oil, and a HFC system refrigerant, and a mineral oil phase with a low consistency is located in the upper phase 20, and the high ester oil and the refrigerant phase of a consistency are located in the lower phase 21 in an isolation region 18. If an interconnecting tube 8 to liquid cooling intermediation is supplied for an interconnecting tube 6 to mineral oil, and ester oil, closing valve 22b in this condition, the oil level of upper phase 20 and lower phase 21 both sides goes up in an isolation region 18, when the oil-level location of the upper phase 20 exceeds a diaphragm 17, the mineral oil of the upper phase 20 will flow into the are recording field 19, and mineral oil will be accumulated in the are recording field 19. Moreover, if valve 22b is opened, the ester oil in the lower phase 21 and liquid cooling intermediation will flow out from an excurrent canal 9, and when the oil level of the lower phase 21 falls, the oil level in an isolation region 18 will fall. Liquid cooling intermediation evaporates and evaporates the ester oil and liquid cooling intermediation which flowed out from the excurrent canal 9 by the refrigerant heat exchanger 10, and ester oil and a gas refrigerant flow into inflow piping of a compressor 1. In addition, although liquid cooling intermediation exists according to operational status in an accumulator 4, even if liquid cooling intermediation flows into an isolation region 18 through an interconnecting tube 6 in that case, it is satisfactory only by being mixed with the liquid cooling intermediation which flows through an interconnecting tube 8.

[0031] if an interconnecting tube 8 to liquid cooling intermediation is continuously supplied for mineral oil and ester oil from an interconnecting tube 6 here, with valve 22b closed -- the oil level of upper phase 20 and lower phase 21 both sides -- going up -- the upper phase 20 -- all -- the are recording field 19 -- moving -- just -- being alike, although the lower phase 21 also moves to an are recording field It is satisfactory, without the lower phase 21 moving to an are recording field, if it controls to open valve 22b before the lower phase 21 moves to the are recording field 19. Moreover, if valve 22b is kept opened, when the oil level and total amount of the lower phase 21 become less and the lower phase 21 is lost, it will flow out of an excurrent canal 9 to the upper phase 20, but it is satisfactory, if it controls to shut valve 22b before the upper phase 20 flows out of an excurrent canal 9. It is satisfactory, if a float is made to float to the interface of the upper phase 20 and the lower phase 21, the location of a float detects an interface as the approach of control, for example and closing motion of valve 22b is controlled.

[0032] Like, by [this] using the lubricating oil are recording device 50, it remained to established extended piping and a use side machine continuously, carrying out the usual air-conditioning / refrigeration operation, for example, the lubricating oil for refrigerating cycles using a CFC system refrigerant like mineral oil or a HCFC system refrigerant can be continuously accumulated in the part in a refrigerant circuit.

[0033] In addition, without are recording of a lubricating oil being checked by the rapid rate of flow of the Maine circuit by installing in the location bypassed from the refrigerant circuit in Maine which connects a compressor 1, a four way valve 2, the heat-source side heat exchanger 3, a flow regulator 13, the use side heat exchanger 12, and an accumulator 4, lubricating oil are recording means 5A is stabilized, and can accumulate the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant. Moreover, when lubricating oils like mineral oil are fully collected, valves 22a, 22b, and 32 can be closed, and a lubricating oil are recording device can be separated.

[0034] Moreover, after catching the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant to a pressurized container like an accumulator, by making it flow into a lubricating oil are recording device, the inflow of the lubricating oil to a lubricating oil are recording device is controllable, it is stabilized and the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant can be accumulated. Furthermore, the dependability of refrigerating cycle equipment not only improves, but by installing before a compressor inhalant canal like [between an evaporator and a

compressor], the lubricating oil for refrigerating cycles using the CFC system refrigerant or HCFC system refrigerant which remained for established piping does not flow into a compressor, and the are recording of the above-mentioned pressurized container to an efficient lubricating oil are recording device is attained.

[0035] In addition, although ester oil was used with the gestalt of this operation as the second lubricating oil for refrigerating cycles which used the HFC system refrigerant as the second refrigerant, even if it uses a HFC system refrigerant and an ether oil with compatibility, it cannot be overemphasized that the same effectiveness is done so. Moreover, the second lubricating oil is not limited to these. Moreover, as the second refrigerant, it is also possible to use natural refrigerants other than a HFC system refrigerant, such as HC, ammonia, and carbon dioxide gas.

[0036] In addition, the refrigerant whose first above-mentioned refrigerant has been used, and the second refrigerant may be regarded as an alternative refrigerant. Or the old refrigerant and the second refrigerant may be called for the first refrigerant as a new refrigerant. Moreover, a refrigerant with a heavy load [as opposed to an environment for the first refrigerant] and the second refrigerant may be regarded as a refrigerant with the light load to an environment.

[0037] Gestalt 2. drawing 3 of operation is the schematic diagram of the configuration of the lubricating oil are recording means by the gestalt 2 of operation of this invention. In addition, in drawing 3 , the same sign is given to drawing 1 , the same part as 2, or a corresponding part, and explanation is omitted. The activated carbon with which 23 adsorb alternatively the lubricating oil for refrigerating cycles using a CFC system refrigerant like mineral oil or a HCFC system refrigerant, and 24 and 25 are filters which prevent the outflow of activated carbon 23 like a sintered metal among drawing 3 . 26 is the up space in the processing tub 5, and 27 is the lower space in the processing tub 5. Thus, constituted lubricating oil are recording means 5B is changed into lubricating oil are recording means 5A shown in drawing 1 , it connects, and the lubricating oil are recording device 50 is constituted, and a refrigerant circuit is constituted. The liquid cooling intermediation which flowed from the mineral oil, the ester oil, and the interconnecting tube 8 which flowed from the interconnecting tube 6 reaches the space 26 in lubricating oil are recording means 5B. The mineral oil which flowed in space 26, ester oil, and a refrigerant pass a filter 25, and flow into activated carbon 23. Activated carbon 23 has a low polarity, in mineral oil, ester oil, and a refrigerant, most, adsorbs polar low mineral oil alternatively, and accumulates it. The ester oil and the refrigerant by which activated carbon 23 is not adsorbed flow into space 27 through a filter 24, and flow out of an excurrent canal 9. In addition, although liquid cooling intermediation exists according to operational status in an accumulator 4, even if liquid cooling intermediation flows into space 26 through an interconnecting tube 6 in that case, it is satisfactory only by being mixed with the liquid cooling intermediation which flows through an interconnecting tube 8.

[0038] Mineral oil can be continuously accumulated in the part in a refrigerant circuit like by [this] making mineral oil, ester oil, and a refrigerant flow into the lubricating oil are recording device 50, carrying out the usual air-conditioning / refrigeration operation.

[0039] Moreover, activated carbon 23 can also carry out adsorption treatment also of the chlorine-based compound and sulfur system compound which are the injurious ingredient which dissolves into a lubricating oil.

[0040] In addition, although mineral oil, ester oil, and a refrigerant were flowed into lubricating oil are recording means 5B in the gestalt of this operation, a refrigerant is not flowed, but although ** can also carry out adsorption are recording of the mineral oil alternatively by adsorption by activated carbon, the direction into which the refrigerant was made to flow can lower the viscosity of the mineral oil within lubricating oil are recording means 5B, ester oil, and refrigerant mixed liquor, and adsorption are recording effectiveness improves.

[0041] In addition, without are recording of a lubricating oil being checked by the rapid rate of flow of the Maine circuit by installing in the location bypassed from the refrigerant circuit in Maine which connects a compressor 1, a four way valve 2, the heat-source side heat exchanger 3, a flow regulator 13, the use side heat exchanger 12, and an accumulator 4, lubricating oil are recording means 5B is stabilized, and can accumulate the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant.

[0042] Moreover, after catching the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant to a pressurized container like an accumulator, by flowing into a lubricating oil are recording device, the inflow of the lubricating oil to a lubricating oil are recording device is controllable, it is stabilized and the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant can be accumulated. Furthermore, the dependability of refrigerating cycle equipment not only improves, but by installing before a compressor inhalant canal like [between an evaporator and a compressor], the lubricating oil for refrigerating cycles using the CFC system refrigerant or HCFC system refrigerant which remained for established piping does not flow into a compressor, and the are recording of the above-mentioned pressurized container to an efficient lubricating oil are recording device is attained.
[0043] In addition, although ester oil was used with the gestalt of this operation as a lubricating oil for refrigerating cycles which used the HFC system refrigerant, even if it uses a polar high ether oil, it is here [where the same effectiveness is done so] needless to say.
[0044] Gestalt 3. drawing 4 of operation is the schematic diagram of the configuration of the lubricating oil are recording means by the gestalt 3 of operation of this invention. In addition, in drawing 4 , the same sign is given to the same part as drawing 1 -3, or a corresponding part, and explanation is omitted. For example, 28 can pass the matter below magnitude with a fixed molecular size among drawing 4 , it is a demarcation membrane and 31 is the heater installed in the pars basilaris ossis occipitalis of lubricating oil are recording device 5C. From the demarcation membrane 28 in the processing tub 5, it is 29 between absentminded and 30 are the are recording field of the mineral oil below the demarcation membrane 28 in the processing tub 5. Thus, constituted lubricating oil are recording means 5C is changed into lubricating oil are recording means 5A shown in drawing 1 , it connects, and the lubricating oil are recording device 50 is constituted, and a refrigerant circuit is constituted. The liquid cooling intermediation which flowed from the mineral oil, the ester oil, and the interconnecting tube 8 which flowed from the interconnecting tube 6 reaches the space 29 in lubricating oil are recording means 5C. The molecular weight of the principal component of mineral oil is 200-600, only mineral oil can pass a demarcation membrane 28, and will reach the are recording field 30 in lubricating oil are recording means 5C, and the molecular weight of the principal component of typical ester oil will be accumulated in a pars basilaris ossis occipitalis by self-weight, if molecular weight uses about the demarcation membrane 28 which can pass 650 or less component, since it is about 700-800. Here, since molecular weight is smaller than a lubricating oil, although a refrigerant passes a demarcation membrane 28, by heating a heater 31 periodically, only the low refrigerant of the boiling point evaporates it, it passes a demarcation membrane 28 again, and results to space 29. The ester oil and the refrigerant which remain to space 29 flow out of an excurrent canal 9. In addition, although liquid cooling intermediation exists according to operational status in an accumulator 4, even if liquid cooling intermediation flows into space 29 through an interconnecting tube 6 in that case, it is satisfactory only by being mixed with the liquid cooling intermediation which flows through an interconnecting tube 8.
[0045] Mineral oil can be continuously accumulated in the part in a refrigerant circuit like by [this] making mineral oil, ester oil, and a refrigerant flow into lubricating oil are recording means 5C, carrying out the usual air-conditioning / refrigeration operation.
[0046] Moreover, it can pass, if injurious ingredients, such as a lubricating oil degradation object and a processing oil used into a production process, also have low molecular weight, and a demarcation membrane 28 can be accumulated in the are recording field 30.
[0047] In addition, the direction into which it made the refrigerant flow although ** can also accumulate mineral oil since only mineral oil passes a demarcation membrane can lower the viscosity of the mineral oil within lubricating oil are recording means 5C, ester oil, and refrigerant mixed liquor by not making a refrigerant flow, although mineral oil, ester oil, and a refrigerant were made to flow into lubricating oil are recording means 5C in the gestalt of this operation, and are recording effectiveness improves.
[0048] In addition, without are recording of a lubricating oil being checked by the rapid rate of flow of the Maine circuit by installing in the location bypassed from the refrigerant circuit in

Maine which connects a compressor 1, a four way valve 2, the heat-source side heat exchanger 3, a flow regulator 13, the use side heat exchanger 12, and an accumulator 4, lubricating oil are recording means 5C is stabilized, and can accumulate the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant.

[0049] Moreover, after catching the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant to a pressurized container like an accumulator, by making it flow into a lubricating oil are recording device, the inflow of the lubricating oil to a lubricating oil are recording device is controllable, it is stabilized and the lubricating oil for refrigerating cycles using a CFC system refrigerant or a HCFC system refrigerant can be accumulated. Furthermore, the dependability of refrigerating cycle equipment not only improves, but by installing before a compressor inhalant canal like [between an evaporator and a compressor], the lubricating oil for refrigerating cycles using the CFC system refrigerant or HCFC system refrigerant which remained for established piping does not flow into a compressor, and the are recording of the above-mentioned pressurized container to an efficient lubricating oil are recording device is attained.

[0050] In addition, although ester oil was used with the gestalt of this operation as a lubricating oil for refrigerating cycles which used the HFC system refrigerant, even if it uses a HFC system refrigerant and an ether oil with compatibility, it is here [where the same effectiveness is done so] needless to say.

[0051]

[Effect of the Invention] Since this invention is constituted as mentioned above, the following effectiveness is done so. Refrigerating cycle equipment according to claim 1 extended piping which was being used for the refrigerating cycle equipment which used the first refrigerant and first lubricating oil, and/or a use side machine In the refrigerating cycle equipment used as extended piping of the refrigerating cycle equipment using the second refrigerant and second lubricating oil, and/or a use side machine Since it has an are recording means to accumulate continuously said first lubricating oil which remained to said extended piping and/or a use side machine in the part in a refrigerant circuit, carrying out refrigerating cycle operation Since it is not necessary to wash extended piping established with the cleaning agent of dedication, and/or a use side machine, washing cost is not only reducible, but there is also no danger that an unnecessary cleaning agent will remain, and the dependability of refrigerating cycle equipment improves. Moreover, since a lubricating oil is accumulated continuously, carrying out the usual air-conditioning / refrigeration operation, construction construction can be completed only by exchanging heat souce newly, it is a short time and extended piping established by low cost and/or use of a use side machine are attained.

[0052] Moreover, in the thing of claim 1, since said are recording means separates said first lubricating oil using the difference of the solubility to said second refrigerant of said first lubricating oil and said second lubricating oil, the refrigerating cycle equipment by invention of claim 2 can separate and accumulate the first lubricating oil of the refrigerating cycle equipment using the first refrigerant, even if it does not use an excessive adsorption member etc.

[0053] Moreover, in the thing of claim 1, since said are recording means separates said first lubricating oil using the adsorbent difference over the activated carbon of said first lubricating oil and said second lubricating oil, not only the first lubricating oil of the refrigerating cycle equipment using the first refrigerant but a chlorine-based compound, a sulfur system compound, etc. which are an injurious ingredient can adsorb and accumulate the refrigerating cycle equipment by invention according to claim 3.

[0054] Moreover, in the thing of claim 1, since said are recording means separates said first lubricating oil using the demarcation membrane which can pass said first lubricating oil and cannot pass said second lubricating oil, the refrigerating cycle equipment by invention according to claim 4 can do separation and are recording not only of the first lubricating oil of the refrigerating cycle equipment using the first refrigerant but other injurious ingredients with small molecular weight through a demarcation membrane.

[0055] Moreover, in one thing of claims 1-4, without are recording of a lubricating oil being checked by the rapid rate of flow of a main coolant circuit since it is installed in the location

which said are recording means bypassed from the main coolant circuit of said refrigerating cycle equipment, the refrigerating cycle equipment by invention according to claim 5 is stabilized, and can separate and accumulate the first lubricating oil for refrigerating cycles using the first refrigerant.
[0056] Moreover, the refrigerating cycle equipment by invention according to claim 6 or 7 Since it was made to flow into said are recording means in one thing of claims 1–5 after said the first lubricating oil and said second lubricating oil flowed into the pressurized container in the refrigerant circuit of said refrigerating cycle equipment The inflow of the lubricating oil to a lubricating oil are recording device is controllable, it is stabilized, and the first lubricating oil for refrigerating cycles using the first refrigerant can be separated and accumulated.
[0057] Moreover, in one thing of claims 1–7, said first refrigerant of invention according to claim 8 is a chlorofluorocarbon system refrigerant or a hydrochlorofluorocarbon system refrigerant. Said first lubricating oil is mineral oil, and a hydro fluorocarbon system refrigerant is used as said second refrigerant. Since **, ester oil, or an ether oil is compatibility at a HFC system refrigerant, using ester oil or an ether oil as said second lubricating oil, Since it not only can accumulate mineral oil to a lubricating oil are recording device, but it carries out two–phase separation and mineral oil can be accumulated by activated carbon using a polar difference, and a demarcation membrane separates and it can accumulate further using the difference of molecular weight, various variations, and the separation and are recording which combine and come out are possible.
[0058] Moreover, the operating method of the refrigerating cycle equipment by invention according to claim 9 to 11 Extended piping which was being used for the refrigerating cycle equipment using the first refrigerant and first lubricating oil, and/or a use side machine Using as extended piping of the refrigerating cycle equipment using the second refrigerant and second lubricating oil, and/or a use side machine, and carrying out refrigerating cycle operation Since said first lubricating oil which remained to said extended piping and/or a use side machine is continuously accumulated in the part in a refrigerant circuit, established piping and/or a use side machine are written as it is available, established piping and/or a use side machine can be reused by low cost, and renewal of refrigerating cycle equipment is attained.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing the refrigerant circuit of the refrigerating cycle equipment by the gestalt 1 of implementation of this invention.
[Drawing 2] Drawing having shown the lubricating oil are recording means of the gestalt 1 of implementation of this invention.
[Drawing 3] Drawing having shown the lubricating oil are recording means of the gestalt 2 of implementation of this invention.
[Drawing 4] Drawing having shown the lubricating oil are recording means of the gestalt 3 of

implementation of this invention.
[Drawing 5] Drawing showing the refrigerant circuit of conventional refrigerating cycle equipment.

[Drawing 6] Drawing showing the usage of established piping by the retrofit of the conventional example.
[Description of Notations]
1 Compressor 2 Four Way Valve 3 Heat-Source Side Heat Exchanger 4 Accumulator, 5A, 5B, 5C Lubricating oil are recording means 5 Processing tub 6 Interconnecting tube, 7 Liquid tube 8 Interconnecting tube 9 Excurrent canal 10 Refrigerant heat exchanger, 11 An exterior unit, 12 Use side heat exchanger 13 Flow regulator, 14 Use side machine 15 Liquid extension piping 16 Gas extension piping, 17 Diaphragm 18 Isolation region 19 are-recording field, 20 Top phase 21 Bottom phase 22a and 22b A valve and 23 Activated carbon, 24 Filter 25 Filter 26 Space, 27 Space, 28 Demarcation membrane 29 Space 30 Are recording field, 31 Heater 32 flow regulators 33 Compressor, 34 A four way valve, 35 Heat-source side heat exchanger 36 The 1st actuation valve, 37 2nd actuation valve 38 Accumulator 38a oil returning hole 39 Flow regulator 40 Use side heat exchanger 50 A lubricating oil are recording device, A Heat souce B Use side machine C The 1st connecting piping D The 2nd connecting piping.

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2002－181417
（P2002－181417A）
(43)公開日　平成14年６月26日(2002.6.26)

(51)Int.Cl.⁷	識別記号	ＦＩ	テーマコード（参考）
Ｆ２５Ｂ　45/00		Ｆ２５Ｂ　45/00	Ｈ
1/00	３８５	1/00	３８５Ｚ
	３９５		３９５Ｚ
43/02		43/02	Ｎ

審査請求　未請求　請求項の数11　ＯＬ　（全 10 頁）

(21)出願番号　特願2000－382887(P2000－382887)
(22)出願日　平成12年12月15日(2000.12.15)

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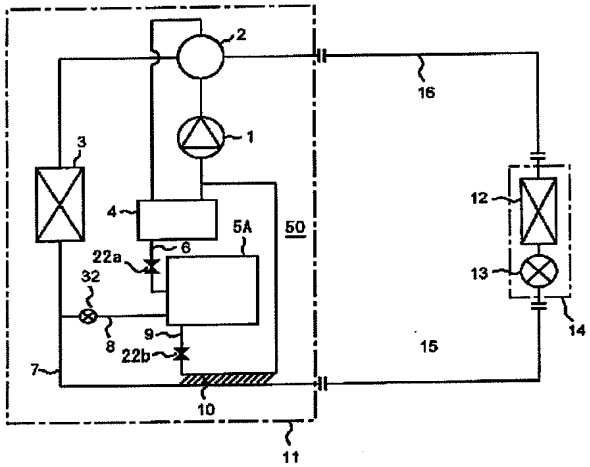
最終頁に続く

(54)【発明の名称】　冷凍サイクル装置およびその運転方法

(57)【要約】
【課題】　既設の冷凍サイクル装置を新規の冷媒を用いたものに更新し、旧設備の潤滑油を回収し運転する装置および方法を得る。
【解決手段】　クロロフルオロカーボン系冷媒またはハイドロクロロフルオロカーボン系冷媒を用いた冷凍サイクル装置に使用していた延長配管を、ハイドロフルオロカーボン系冷媒を用いた冷凍サイクル装置の延長配管として用い、冷凍サイクル運転を実施しながら、延長配管に残留した鉱油を連続的に冷媒回路内の一部に蓄積する蓄積手段を設ける。



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【特許請求の範囲】

【請求項１】　第一の冷媒と第一の潤滑油を用いた冷凍サイクル装置に使用していた延長配管及び／又は利用側機を、第二の冷媒と第二の潤滑油を用いた冷凍サイクル装置の延長配管及び／又は利用側機として用いる冷凍サイクル装置において、冷凍サイクル運転を実施しながら、前記延長配管及び／又は利用側機に残留した前記第一の潤滑油を連続的に冷媒回路内の一部に蓄積する蓄積手段を有することを特徴とする冷凍サイクル装置。

【請求項２】　前記蓄積手段は、前記第一の潤滑油と前記第二の潤滑油の前記第二の冷媒に対する溶解度の差を利用して前記第一の潤滑油を分離することを特徴とする請求項１に記載の冷凍サイクル装置。

【請求項３】　前記蓄積手段は、前記第一の潤滑油と前記第二の潤滑油の活性炭に対する吸着性の差を利用して前記第一の潤滑油を分離することを特徴とする請求項１に記載の冷凍サイクル装置。

【請求項４】　前記蓄積手段は、前記第一の潤滑油が通過でき前記第二の潤滑油が通過できない分離膜を用いて前記第一の潤滑油を分離することを特徴とする請求項１に記載の冷凍サイクル装置。

【請求項５】　前記蓄積手段が前記冷凍サイクル装置の主冷媒回路からバイパスした位置に設置されたことを特徴とする請求項１～４のいずれかに記載の冷凍サイクル装置。

【請求項６】　前記第一の潤滑油および前記第二の潤滑油が前記冷凍サイクル装置の冷媒回路中の圧力容器に流入した後、前記蓄積手段に流入するようにしたことを特徴とする請求項１～５のいずれかに記載の冷凍サイクル装置。

【請求項７】　前記圧力容器がアキュムレータであることを特徴とする請求項６に記載の冷凍サイクル装置。

【請求項８】　前記第一の冷媒がクロロフルオロカーボン系冷媒またはハイドロクロロフルオロカーボン系冷媒で、前記第一の潤滑油が鉱油またはアルキルベンゼン油であり、前記第二の冷媒としてハイドロフルオロカーボン系冷媒を用い、前記第二の潤滑油としてエステル油またはエーテル油を用いることを特徴とする請求項１～７のいずれかに記載の冷凍サイクル装置。

【請求項９】　第一の冷媒と第一の潤滑油を用いた冷凍サイクル装置に使用していた延長配管及び／又は利用側機を、第二の冷媒と第二の潤滑油を用いた冷凍サイクル装置の延長配管及び／又は利用側機として用い、冷凍サイクル運転を実施しながら、前記延長配管及び／又は利用側機に残留した前記第一の潤滑油を連続的に冷媒回路内の一部に蓄積することを特徴とする冷凍サイクル装置の運転方法。

【請求項１０】　前記冷凍サイクル装置の冷媒回路中の圧力容器から流出した前記第一の潤滑油および前記第二の潤滑油から前記第一の潤滑油を分離するようにしたことを特徴とする請求項９に記載の冷凍サイクル装置の運転方法。

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【請求項１１】　前記第一の冷媒がクロロフルオロカーボン系冷媒またはハイドロクロロフルオロカーボン系冷媒で、前記第一の潤滑油が鉱油またはアルキルベンゼン油であり、前記第二の冷媒としてハイドロフルオロカーボン系冷媒を用い、前記第二の潤滑油としてエステル油またはエーテル油を用いることを特徴とする請求項９または１０に記載の冷凍サイクル装置の運転方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、一般に冷媒を交換して使用する冷凍サイクル装置に関するものである。一例としては、クロロフルオロカーボン（ＣＦＣ）系冷媒またはハイドロクロロフルオロカーボン（ＨＣＦＣ）系冷媒をハイドロフルオロカーボン（ＨＦＣ）系冷媒に交換して使用する冷凍サイクル装置に関するものであり、さらに詳しくは、熱源機を新規のＨＦＣ系冷媒を用いたものに更新し、ＣＦＣ系冷媒またはＨＣＦＣ系冷媒で用いていた既設の延長配管及び／又は利用側機を特別な洗浄運転を実施せずに、通常の冷凍・空調運転を行いながら、既設配管及び／又は利用側機に残留した潤滑油を冷媒回路内の一部に蓄積することにより既設配管及び／又は利用側機を流用可能とする冷凍サイクル装置に関するものである。

【０００２】

【従来の技術】従来より一般に用いられている冷凍サイクル装置の構成図を図５に示す。図５において、Ａは熱源機であり、圧縮機３３、四方弁３４、熱源側熱交換器３５、第１の操作弁３６、第２の操作弁３７、アキュムレータ３８を内蔵している。Ｂは利用側機であり、流量調整器３９及び利用側熱交換器４０を備えている。熱源機Ａと利用側機Ｂは、第１の接続配管Ｃ、第２の接続配管Ｄにより接続されて、冷凍サイクルを形成する。なお、利用側機Ｂは空調装置などにおいては室内機と称してもよい。

【０００３】第１の接続配管Ｃの一端は熱源機側熱交換器３５と第１の操作弁３６を介して接続され、第１の接続配管Ｃの他の一端は流量調整器３９と接続されている。第２の接続配管Ｄの一端は四方弁３４と第２の操作弁３７を介して接続され、第２の接続配管Ｄの他の一端は利用側熱交換器４０と接続されている。また、アキュムレータ３８のＵ字管状の流出配管の下部には返油穴３８ａが設けられている。

【０００４】この冷凍サイクル装置の冷媒の流れを図５に沿って説明する。図５中、実線矢印が冷房運転の流れを、破線矢印が暖房運転の流れを示す。まず、冷房運転の流れを説明する。圧縮機３３で圧縮された高温高圧のガス冷媒は四方弁３４を経て、熱源側熱交換器３５へと流入し、ここで媒体と熱交換して凝縮液化する。凝縮液

化した冷媒は第１の操作弁３６、第１の接続配管Ｃを経て流量調整器３９へ流入し、減圧されて低圧の二相状態となり、利用側熱交換器４０で利用媒体と熱交換して蒸発・ガス化する。蒸発・ガス化した冷媒は第２の接続配管Ｄ、第２の操作弁３７、四方弁３５、アキュムレータ３８を経て圧縮機３３へ戻る。

【０００５】次に、暖房運転の流れを説明する。圧縮機３３で圧縮された高温高圧のガス冷媒は四方弁３４、第２の操作弁３７、第２の接続配管Ｄを経て、利用側熱交換器４０へと流入し、利用媒体と熱交換して凝縮液化する。凝縮液化した冷媒は流量調整器３９へ流入し、減圧されて低圧二相状態となり、第１の接続配管Ｃ、第１の操作弁３６を経て、熱源機側熱交換器３５で媒体と熱交換して蒸発・ガス化する。蒸発・ガス化した冷媒は四方弁３４、アキュムレータ３８を経て圧縮機３３へ戻る。

【０００６】従来、このような冷凍サイクル装置では、ＣＦＣ系冷媒やＨＣＦＣ系冷媒が用いられてきたが、これらの冷媒はオゾン層を破壊するため、生産規制対象さらには全廃対象となっている。これらの冷媒の代替として、ＨＦＣ系冷媒を用いた冷凍サイクル装置が実現化されている。

【０００７】ＣＦＣ系冷媒やＨＣＦＣ系冷媒を用いた冷凍サイクル装置が老朽化した際には、新たな冷凍サイクル装置に入れ替える必要があるが、ＣＦＣ系冷媒やＨＣＦＣ系冷媒は全廃、生産規制の対象となっているため、ＨＦＣ系冷媒等の異なる冷媒を用いた冷凍サイクル装置に入れ替える必要がある。

【０００８】しかしながら、熱源機Ａと利用側機Ｂを接続する第１の接続配管Ｃと第２の接続配管Ｄ及び利用側機Ｂは、熱源機Ａと比べて利用可能期間が長く、老朽化もしないため、そのまま使用できれば、簡略的に、また、低コストで冷凍サイクル装置の入れ替えが可能である。

【０００９】しかしながら、ＣＦＣ系冷媒やＨＣＦＣ系冷媒を用いていた冷凍サイクル装置で使用していた接続配管Ｃ、接続配管Ｄには、潤滑油として用いていた鉱油、アルキルベンゼン油等が残存している。

【００１０】接続配管Ｃ、接続配管Ｄに上記残留物が多く残存した状態で、例えばＨＦＣ系冷媒を用いた冷凍サイクル装置を接続し、接続配管Ｃ、接続配管Ｄを使用すると、残存していた鉱油、アルキルベンゼン油等がＨＦＣ系冷媒で使用する潤滑油に混入し、ＨＦＣ系冷媒を用いた冷凍サイクル装置用の潤滑油の劣化が促進され、ＨＦＣ系冷媒を用いた冷凍サイクル装置の信頼性が損なわれる。

【００１１】このため、従来はＣＦＣ系冷媒やＨＣＦＣ系冷媒を用いた冷凍サイクル装置で使用していた第１の接続配管Ｃと第２の接続配管Ｄ及び利用側機ＢによりＨＦＣ系冷媒を用いた冷凍サイクル装置を構成し、接続配管Ｃ、接続配管Ｄ及び利用側機Ｂを使用する場合には、接続配管Ｃ、接続配管Ｄ、利用側機Ｂを専用の洗浄剤で洗浄する必要があった。

【００１２】また、図６は特開平６－２４９５５１号公報に記載の既設配管利用方法の従来例であり、既設配管中に残留する鉱油を回収し、レトロフィットにより既設配管を利用可能とするものであり、主にカーエアコンを対象としたものである。従来例では、まず、ＣＦＣ系冷媒及び／又はＨＣＦＣ系冷媒を回収後、ＨＦＣ系冷媒を充填し、高圧側及び低圧側サービスポートに点線枠で図示したバルブ６１，６２，６３、分離管６４、ドレイン６５、蒸発器６６からなる分離器６０を取り付け、バルブ６１，６３を閉じたまま分離器６０を隔離した状態で冷凍機を運転する。ＨＦＣ系冷媒及びＨＦＣ系冷媒に溶解したＨＦＣ系冷媒用潤滑油は、既設配管に残留した鉱油を巻き込んで移動する。一定時間運転した後、減圧真空にした分離管６４へのバルブ６１を開け、白濁した状態の溶解状のＨＦＣ系冷媒、ＨＦＣ系冷媒用潤滑油、鉱油を分離管６４に移動させ、バルブ６１を閉じ、下部にＨＦＣ系冷媒とそれに溶解したＨＦＣ系冷媒用潤滑油、上部に鉱油を滞留させ分離分液させる。下部のＨＦＣ系冷媒とそれに溶解したＨＦＣ系冷媒用潤滑油は分離管６４を目視しながら分離器６０の蒸発器６６へのバルブ６３を開け、冷凍機系内に気液混合状態で低圧側サービスポートを通して充填注入する。次いで、バルブ６３を閉め、ドレインへのバルブ６２を開けて鉱油を回収する。この作業を数回繰り返すことにより、鉱油を冷凍サイクルの系外に回収し既設配管を利用可能とするものである。

【００１３】

【発明が解決しようとする課題】図５に示す接続配管Ｃ、接続配管Ｄを専用の洗浄剤で洗浄する方法は、非常に煩雑であり、長時間を要するとともに、洗浄作業にかかるコストが高いという問題点があった。また、洗浄剤が残留した場合、冷凍サイクル装置の信頼性が失われるという問題点もあった。

【００１４】また、図６に示すレトロフィット方法では、カーエアコンのような既設配管が短い場合は、短時間の運転でＨＦＣ系冷媒、ＨＦＣ系冷媒用潤滑油、ＣＦＣ系冷媒またはＨＣＦＣ系冷媒用潤滑油が混合し、洗浄作業を数回繰り返すことにより系内のＣＦＣ系冷媒またはＨＣＦＣ系冷媒用潤滑油濃度を低減できるが、延長配管の長いビル用マルチエアコン、利用側にショーケース等の様々な負荷を用い複雑な冷媒回路となる冷凍機では短時間の運転でＨＦＣ系冷媒、ＨＦＣ系冷媒用潤滑油、ＣＦＣ系冷媒またはＨＣＦＣ系冷媒用潤滑油が混合せず、容易にＣＦＣ系冷媒またはＨＣＦＣ系冷媒用潤滑油濃度を低減することは出来ない。また、長時間かけてこれらが完全に混合したとしても、完全に混合するまでにＣＦＣ系冷媒またはＨＣＦＣ系冷媒用潤滑油が一部混合した状態で空調・冷凍運転を実施するため、機器の信頼

性を損なう可能性があった。

【００１５】さらに、分離管内の上部液面、下部液面を目視観察し、バルブ操作によりＣＦＣ系冷媒またはＨＣＦＣ系冷媒用潤滑油を系外に排出回収していたため、誤操作により上部のＣＦＣ系冷媒用潤滑油またはＨＣＦＣ系冷媒用潤滑油を冷媒回路内に再流出する可能性もあり、熟練を要する作業であった。

【００１６】

【課題を解決するための手段】この発明はかかる問題点を解決するためになされたものであり、請求項１に記載の冷凍サイクル装置は、第一の冷媒と第一の潤滑油を用いた冷凍サイクル装置に使用していた延長配管及び／又は利用側機を、第二の冷媒と第二の潤滑油を用いた冷凍サイクル装置の延長配管及び／又は利用側機として用いる冷凍サイクル装置において、冷凍サイクル運転を実施しながら、前記延長配管及び／又は利用側機に残留した前記第一の潤滑油を連続的に冷媒回路内の一部に蓄積する蓄積手段を有するものである。

【００１７】また、請求項２の発明による冷凍サイクル装置は、請求項１のものにおいて、前記蓄積手段が、前記第一の潤滑油と前記第二の潤滑油の前記第二の冷媒に対する溶解度の差を利用して前記第一の潤滑油を分離するものである。

【００１８】また、請求項３に記載の発明による冷凍サイクル装置は、請求項１のものにおいて、前記蓄積手段が、前記第一の潤滑油と前記第二の潤滑油の活性炭に対する吸着性の差を利用して前記第一の潤滑油を分離するものである。

【００１９】また、請求項４に記載の発明による冷凍サイクル装置は、請求項１のものにおいて、前記蓄積手段が、前記第一の潤滑油が通過でき前記第二の潤滑油が通過できない分離膜を用いて前記第一の潤滑油を分離するものである。

【００２０】また、請求項５に記載の発明による冷凍サイクル装置は、請求項１～４のいずれかのものにおいて、前記蓄積手段が前記冷凍サイクル装置の主冷媒回路からバイパスした位置に設置されたものである。

【００２１】また、請求項６に記載の発明による冷凍サイクル装置は、請求項１～５のいずれかのものにおいて、前記第一の潤滑油および前記第二の潤滑油が前記冷凍サイクル装置の冷媒回路中の圧力容器に流入した後、前記蓄積手段に流入するようにしたものである。

【００２２】また、請求項７に記載の発明による冷凍サイクル装置は、請求項６のものにおいて、前記圧力容器がアキュムレータであるものである。

【００２３】また、請求項８に記載の発明は、請求項１～７のいずれかのものにおいて、前記第一の冷媒がクロロフルオロカーボン系冷媒またはハイドロクロロフルオロカーボン系冷媒で、前記第一の潤滑油が鉱油またはアルキルベンゼン油であり、前記第二の冷媒としてハイドロフルオロカーボン系冷媒を用い、前記第二の潤滑油としてエステル油またはエーテル油を用いるものである。

【００２４】また、請求項９に記載の発明による冷凍サイクル装置の運転方法は、第一の冷媒と第一の潤滑油を用いた冷凍サイクル装置に使用していた延長配管及び／又は利用側機を、第二の冷媒と第二の潤滑油を用いた冷凍サイクル装置の延長配管及び／又は利用側機として用い、冷凍サイクル運転を実施しながら、前記延長配管及び／又は利用側機に残留した前記第一の潤滑油を連続的に冷媒回路内の一部に蓄積するものである。

【００２５】また、請求項１０に記載の発明による冷凍サイクル装置の運転方法は、請求項１０の方法において、前記冷凍サイクル装置の冷媒回路中の圧力容器から流出した前記第一の潤滑油および前記第二の潤滑油から前記第一の潤滑油を分離するようにしたものである。

【００２６】また、請求項１１に記載の発明による冷凍サイクル装置の運転方法は、請求項９または１０の方法において、前記第一の冷媒がクロロフルオロカーボン系冷媒またはハイドロクロロフルオロカーボン系冷媒で、前記第一の潤滑油が鉱油またはアルキルベンゼン油であり、前記第二の冷媒としてハイドロフルオロカーボン系冷媒を用い、前記第二の潤滑油としてエステル油またはエーテル油を用いるものである。

【００２７】

【発明の実施の形態】実施の形態１．図１は、本発明の実施の形態１による潤滑油蓄積機構を搭載した冷凍サイクル装置の冷媒回路を示す図である。図１において、１は圧縮機、２は四方弁、３は熱源側熱交換器、４はアキュムレータ、５Ａは潤滑油蓄積手段である。アキュムレータ４の下部と潤滑油蓄積手段５Ａは弁２２ａを介して連結管６により接続されている。連結管６はアキュムレータ４で分離された潤滑油を排出して潤滑油蓄積手段５Ａに流入させる。また、潤滑油蓄積手段５Ａは連結管８により流量調整器３２を介して液管７と接続され、流出管９により弁２２ｂを介して圧縮機１の入口部と接続されている。１０は冷媒熱交換器であり、流出管９を流通する冷媒と液管７を流通する冷媒との間で熱交換をさせるものである。以上説明した潤滑油蓄積手段５Ａを中心とし、これに接続された連結管６、連結管８、流出管９、弁２２ａ，２２ｂ、流量調整器３２を含んで、潤滑油蓄積機構５０が構成されている。また、圧縮機１、四方弁２、熱源側熱交換器３、アキュムレータ４、潤滑油蓄積手段５Ａを含んで、室外機１１が形成されている。また、１２は利用側熱交換器、１３は流量調整器であり、これらにより利用側機１４が形成されている。さらに１５は液延長配管、１６はガス延長配管である。

【００２８】第一の冷媒、具体例としてはＨＣＦＣ系冷媒またはＣＦＣ系冷媒を用いた冷凍サイクル装置で使用していた液延長配管１５、ガス延長配管１６、利用側機１４を流用し、第二の冷媒、具体例としてはＨＦＣ系冷

媒を用いた室外機１１を新設し、上記のような冷凍サイクル装置を構築した場合の冷房運転の動作について説明する。圧縮機１を吐出した高温・高圧のガス冷媒は四方弁２を経て、熱源側熱交換器３で放熱し、凝縮・液化して液管７を経て、液延長配管１５を流れる。液延長配管１５、ガス延長配管１６、利用側機１４にはＨＣＦＣ系冷媒またはＣＦＣ系冷媒の冷凍サイクル装置で用いていた第一の潤滑油、具体例としては例えば鉱油が残留しており、液延長配管１５を流れる液冷媒は、残留する鉱油を、液冷媒と鉱油の間に生じるせん断力によりひきずりながら、流れていく。液延長配管１５を流れた液冷媒は、利用側機１４に入り蒸発気化し、利用側機１４内に残留した鉱油をひきずりながらガス延長配管１６に流入し、ガス延長配管１６に残留する鉱油をひきずりながら四方弁２を経てアキュムレータ４に流入し、圧縮機１へ戻る。この過程で、ＨＦＣ系冷媒とともに用いていた第二の潤滑油、具体例としては例えばエステル油のような潤滑油が圧縮機１から吐出され、ＨＦＣ系冷媒とともに冷媒配管中を循環し、既設配管中に残留していた鉱油と混合し、冷媒とともにアキュムレータ４に流入する。

【００２９】次に、暖房運転をした場合の動作について説明する。圧縮機１を吐出した高温・高圧のガス冷媒は、四方弁２を経てガス延長配管１６を流れる。この時、ガス延長配管１６に残留する鉱油はガス冷媒にひきずられながら流れ、利用側熱交換器１２に入り、ここで放熱して凝縮・液化し、利用側熱交換器１２内に残留した鉱油とともに流量調整器１３で絞られ低圧の二相状態となる。この低圧の二相冷媒と鉱油は液延長配管１５を流れ、液延長配管１５内に残留する鉱油をひきずりながら流れ、室外機１１に入り、熱源側熱交換器３で蒸発し、四方弁２を介してアキュムレータ４に流入し、圧縮機１へ戻る。この過程で、圧縮機１から持ち出されたエステル油が冷媒とともに既設の冷媒配管内を循環し、既設配管中に残留していた鉱油と混合し、冷媒とともにアキュムレータ４に流入する。

【００３０】次に潤滑油蓄積手段５Ａについて説明する。潤滑油蓄積手段５Ａは例えば図２に示す構造を有しており、処理槽５の内部を仕切り板１７により分離領域１８および蓄積領域１９に二分されている。仕切り板１７は、一定高さで止められており、上部は左右の領域が連通している。既設配管から回収した鉱油を冷媒回路内に蓄積するには、アキュムレータ４に流入した鉱油とエステル油を連結管６を経由して潤滑油蓄積手段５Ａの分離領域１８に導く。また、連結管８からは流量調整器３２により低圧に絞られた液冷媒が流入し、分離領域１８では、鉱油、エステル油、ＨＦＣ系冷媒の溶解性の差より二相に分離し、密度の低い鉱油相が上相２０に、密度の高いエステル油および冷媒相が下相２１に位置する。かかる状態で弁２２ｂを閉じたまま、連結管６から鉱油とエステル油を、連結管８から液冷媒を供給すると、分離領域１８内で上相２０、下相２１双方の液面が上昇し、上相２０の液面位置が仕切り板１７を越えた時点で上相２０の鉱油が蓄積領域１９に流入し、鉱油が蓄積領域１９に蓄積される。また、弁２２ｂを開くと、下相２１内のエステル油および液冷媒が流出管９より流出し、下相２１の液面が低下することにより分離領域１８内の液面が低下する。流出管９より流出したエステル油と液冷媒は、冷媒熱交換器１０で液冷媒が蒸発・気化し、エステル油とガス冷媒が圧縮機１の流入配管へ流入する。なお、アキュムレータ４内には運転状態により液冷媒が存在するが、その場合、連結管６を通じて液冷媒が分離領域１８に流入しても連結管８を通じて流入する液冷媒と混合されるだけで問題ない。

【００３１】ここで、弁２２ｂを閉じたままで連結管６から鉱油とエステル油を、連結管８から液冷媒を連続的に供給すると上相２０および下相２１双方の液面が上昇し、上相２０が全て蓄積領域１９に移動し、ついには下相２１も蓄積領域に移動するが、下相２１が蓄積領域１９に移動する前に弁２２ｂを開けるように制御しておけば下相２１が蓄積領域に移動することもなく問題ない。また、弁２２ｂを開けたままにしておくと、下相２１の液面およびトータル量が減り、下相２１がなくなった時点で上相２０までも流出管９から流出するが、上相２０が流出管９から流出する前に弁２２ｂを閉めるように制御しておけば問題ない。制御の方法としては、例えば、上相２０と下相２１との境界面にフロートを浮遊させ、フロートの位置により境界面を検出し、弁２２ｂの開閉を制御すれば問題ない。

【００３２】かかるように、潤滑油蓄積機構５０を用いることにより、通常の空調・冷凍運転を実施しながら連続的に既設の延長配管および利用側機に残留した、例えば鉱油のようなＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を連続的に冷媒回路内の一部に蓄積することができる。

【００３３】尚、潤滑油蓄積手段５Ａは、圧縮機１、四方弁２、熱源側熱交換器３、流量調整器１３、利用側熱交換器１２、アキュムレータ４を繋ぐメインの冷媒回路からバイパスした位置に設置することにより、メイン回路の急速な流速により潤滑油の蓄積が阻害されることもなく、安定してＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を蓄積することができる。また、鉱油のような潤滑油が十分に回収された時点では、弁２２ａ，２２ｂ，３２を閉じて、潤滑油蓄積機構を切り離すことができる。

【００３４】また、ＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を例えばアキュムレータのような圧力容器に捕捉した後、潤滑油蓄積機構に流入させることにより、潤滑油蓄積機構への潤滑油の流入量を制御でき、安定してＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を蓄積することができ

る。さらに、上記圧力容器は例えば蒸発器と圧縮機の間のような圧縮機流入管の手前に設置することにより、既設配管に残留したＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油が圧縮機に流入することはなく、冷凍サイクル装置の信頼性が向上するばかりではなく、効率的な潤滑油蓄積機構への蓄積も可能となる。

【００３５】尚、本実施の形態では、第二の冷媒としてのＨＦＣ系冷媒を用いた冷凍サイクル用の第二の潤滑油としてエステル油を用いたが、ＨＦＣ系冷媒と相溶性のあるエーテル油を用いても同様の効果を奏することは言うまでもない。また、第二の潤滑油はこれらに限定されるものではない。また、第二の冷媒としては、ＨＦＣ系冷媒のほかにＨＣ，アンモニア、炭酸ガスなどの自然冷媒を用いることも可能である。

【００３６】なお、上述の第一の冷媒を既使用の冷媒、第二の冷媒を代替冷媒とみてもよい。あるいは、第一の冷媒を旧冷媒、第二の冷媒を新冷媒として称してもよい。また、第一の冷媒を環境に対する負荷が重い冷媒、第二の冷媒を環境に対する負荷が軽い冷媒とみてもよい。

【００３７】実施の形態２．図３は、本発明の実施の形態２による潤滑油蓄積手段の構成の概要図である。なお、図３において、図１、２と同一部分または相当する部分には同一符号を付し、説明を省略する。図３中、２３は例えば鉱油のようなＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を選択的に吸着する活性炭、２４および２５は例えば焼結金属のような活性炭２３の流出を防ぐフィルタである。２６は処理槽５内の上部空間、２７は処理槽５内の下部空間である。このように構成した潤滑油蓄積手段５Ｂを、図１に示した潤滑油蓄積手段５Ａに変えて接続し、潤滑油蓄積機構５０を構成し、また冷媒回路を構成する。連結管６から流入した鉱油、エステル油及び連結管８から流入した液冷媒は、潤滑油蓄積手段５Ｂ内の空間２６に至る。空間２６内に流入した鉱油、エステル油、冷媒はフィルタ２５を通過し、活性炭２３に流入する。活性炭２３は極性が低く、鉱油、エステル油、冷媒の中で最も極性の低い鉱油を選択的に吸着し蓄積する。活性炭２３に吸着されないエステル油、冷媒はフィルタ２４を経て空間２７に流入し、流出管９から流出する。なお、アキュムレータ４内には運転状態により液冷媒が存在するが、その場合、連結管６を通じて液冷媒が空間２６に流入しても連結管８を通じて流入する液冷媒と混合されるだけで問題ない。

【００３８】かかるように、鉱油、エステル油、冷媒を潤滑油蓄積機構５０に流入させることにより、通常の空調・冷凍運転を実施しながら鉱油を連続的に冷媒回路内の一部に蓄積することができる。

【００３９】また、活性炭２３は潤滑油中に溶解する有害成分である塩素系化合物及び硫黄系化合物も吸着除去することもできる。

【００４０】尚、本実施の形態における潤滑油蓄積手段５Ｂには鉱油、エステル油、冷媒を流入したが、冷媒を流入せずとも活性炭による吸着により鉱油を選択的に吸着蓄積することができるが、冷媒を流入させた方が潤滑油蓄積手段５Ｂ内での鉱油、エステル油、冷媒混合液の粘度を下げることができ、吸着蓄積効率が向上する。

【００４１】尚、潤滑油蓄積手段５Ｂは圧縮機１、四方弁２、熱源側熱交換器３、流量調整器１３、利用側熱交換器１２、アキュムレータ４を繋ぐメインの冷媒回路からバイパスした位置に設置することにより、メイン回路の急速な流速により潤滑油の蓄積が阻害されることもなく、安定してＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を蓄積することができる。

【００４２】また、ＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を例えばアキュムレータのような圧力容器に捕捉した後、潤滑油蓄積機構に流入することにより、潤滑油蓄積機構への潤滑油の流入量を制御でき、安定してＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を蓄積することができる。さらに、上記圧力容器は例えば蒸発器と圧縮機の間のような圧縮機流入管の手前に設置することにより、既設配管に残留したＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油が圧縮機に流入することはなく、冷凍サイクル装置の信頼性が向上するばかりではなく、効率的な潤滑油蓄積機構への蓄積も可能となる。

【００４３】尚、本実施の形態では、ＨＦＣ系冷媒を用いた冷凍サイクル用の潤滑油としてエステル油を用いたが、極性の高いエーテル油を用いても同様の効果を奏することは言うまでもない。

【００４４】実施の形態３．図４は、本発明の実施の形態３による潤滑油蓄積手段の構成の概要図である。なお、図４において、図１～３と同一部分または相当する部分には同一符号を付し、説明を省略する。図４中、２８は分子の大きさが一定の大きさ以下の物質を通過することができる、例えば、分離膜で、３１は潤滑油蓄積機構５Ｃの底部に設置されたヒーターである。２９は処理槽５内の分離膜２８より上の空間、３０は処理槽５内の分離膜２８より下の鉱油の蓄積領域である。このように構成した潤滑油蓄積手段５Ｃを、図１に示した潤滑油蓄積手段５Ａに変えて接続し、潤滑油蓄積機構５０を構成し、また冷媒回路を構成する。連結管６から流入した鉱油、エステル油及び連結管８から流入した液冷媒は、潤滑油蓄積手段５Ｃ内の空間２９に至る。鉱油の主成分の分子量は２００～６００であり、代表的なエステル油の主成分の分子量はおよそ７００～８００であるため、およそ分子量が６５０以下の成分が通過できる分離膜２８を用いれば、鉱油のみが分離膜２８を通過でき、潤滑油蓄積手段５Ｃ内の蓄積領域３０に至り、自重により底部に蓄積される。ここで、冷媒は潤滑油より分子量が小さいため、分離膜２８を通過するがヒーター３１を定期的

に加熱することにより、沸点の低い冷媒のみが気化し、再び分離膜２８を通過して空間２９へ至る。空間２９に残存しているエステル油及び冷媒は、流出管９から流出する。なお、アキュムレータ４内には運転状態により液冷媒が存在するが、その場合、連結管６を通じて液冷媒が空間２９に流入しても連結管８を通じて流入する液冷媒と混合されるだけで問題ない。

【００４５】かかるように、鉱油、エステル油、冷媒を潤滑油蓄積手段５Ｃに流入させることにより、通常の空調・冷凍運転を実施しながら鉱油を連続的に冷媒回路内の一部に蓄積することができる。

【００４６】また、分離膜２８は潤滑油劣化物、製造工程中に使用する加工油等の有害成分も分子量が低いものであれば通過することができ、蓄積領域３０に蓄積することができる。

【００４７】尚、本実施の形態における潤滑油蓄積手段５Ｃには鉱油、エステル油、冷媒を流入させたが、冷媒を流入させずとも鉱油のみが分離膜を通過するため、鉱油を蓄積することができるが、冷媒を流入させた方が潤滑油蓄積手段５Ｃ内での鉱油、エステル油、冷媒混合液の粘度を下げることができ、蓄積効率が向上する。

【００４８】尚、潤滑油蓄積手段５Ｃは圧縮機１、四方弁２、熱源側熱交換器３、流量調整器１３、利用側熱交換器１２、アキュムレータ４を繋ぐメインの冷媒回路からバイパスした位置に設置することにより、メイン回路の急速な流速により潤滑油の蓄積が阻害されることもなく、安定してＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を蓄積することができる。

【００４９】また、ＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を例えばアキュムレータのような圧力容器に捕捉した後、潤滑油蓄積機構に流入させることにより、潤滑油蓄積機構への潤滑油の流入量を制御でき、安定してＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油を蓄積することができる。さらに、上記圧力容器は例えば蒸発器と圧縮機の間のような圧縮機流入管の手前に設置することにより、既設配管に残留したＣＦＣ系冷媒またはＨＣＦＣ系冷媒を用いた冷凍サイクル用潤滑油が圧縮機に流入することはなく、冷凍サイクル装置の信頼性が向上するばかりではなく、効率的な潤滑油蓄積機構への蓄積も可能となる。

【００５０】尚、本実施の形態では、ＨＦＣ系冷媒を用いた冷凍サイクル用の潤滑油としてエステル油を用いたが、ＨＦＣ系冷媒と相溶性のあるエーテル油を用いても同様の効果を奏することは言うまでもない。

【００５１】

【発明の効果】この発明は以上のように構成されているので、以下のような効果を奏する。請求項１に記載の冷凍サイクル装置は、第一の冷媒と第一の潤滑油を用いた冷凍サイクル装置に使用していた延長配管及び／又は利用側機を、第二の冷媒と第二の潤滑油を用いた冷凍サイクル装置の延長配管及び／又は利用側機として用いる冷凍サイクル装置において、冷凍サイクル運転を実施しながら、前記延長配管及び／又は利用側機に残留した前記第一の潤滑油を連続的に冷媒回路内の一部に蓄積する蓄積手段を有するので、専用の洗浄剤で既設の延長配管及び／または利用側機を洗浄する必要がないため、洗浄コストを削減できるだけでなく、不要な洗浄剤が残留する危険性もなく、冷凍サイクル装置の信頼性が向上する。また、通常の空調・冷凍運転を実施しながら、連続的に潤滑油を蓄積するため、新規に熱源機を交換するだけで施工工事が完了でき、短時間でかつ低コストで既設の延長配管及び／または利用側機の利用が可能となる。

【００５２】また、請求項２の発明による冷凍サイクル装置は、請求項１のものにおいて、前記蓄積手段が、前記第一の潤滑油と前記第二の潤滑油の前記第二の冷媒に対する溶解度の差を利用して前記第一の潤滑油を分離するので、余分な吸着部材等を利用しなくとも第一の冷媒を用いた冷凍サイクル装置の第一の潤滑油を分離・蓄積できる。

【００５３】また、請求項３に記載の発明による冷凍サイクル装置は、請求項１のものにおいて、前記蓄積手段が、前記第一の潤滑油と前記第二の潤滑油の活性炭に対する吸着性の差を利用して前記第一の潤滑油を分離するので、第一の冷媒を用いた冷凍サイクル装置の第一の潤滑油だけでなく、有害成分である塩素系化合物及び硫黄系化合物等も吸着して蓄積することができる。

【００５４】また、請求項４に記載の発明による冷凍サイクル装置は、請求項１のものにおいて、前記蓄積手段が、前記第一の潤滑油が通過でき前記第二の潤滑油が通過できない分離膜を用いて前記第一の潤滑油を分離するので、第一の冷媒を用いた冷凍サイクル装置の第一の潤滑油だけでなく、分子量の小さな他の有害成分も分離膜を通して分離・蓄積することができる。

【００５５】また、請求項５に記載の発明による冷凍サイクル装置は、請求項１～４のいずれかのものにおいて、前記蓄積手段が前記冷凍サイクル装置の主冷媒回路からバイパスした位置に設置されるので、主冷媒回路の急速な流速により潤滑油の蓄積が阻害されることもなく、安定して第一の冷媒を用いた冷凍サイクル用の第一の潤滑油を分離・蓄積することができる。

【００５６】また、請求項６または７に記載の発明による冷凍サイクル装置は、請求項１～５のいずれかのものにおいて、前記第一の潤滑油および前記第二の潤滑油が前記冷凍サイクル装置の冷媒回路中の圧力容器に流入した後、前記蓄積手段に流入するようにしたので、潤滑油蓄積機構への潤滑油の流入量を制御でき、安定して第一の冷媒を用いた冷凍サイクル用の第一の潤滑油を分離・蓄積することができる。

【００５７】また、請求項８に記載の発明は、請求項１～７のいずれかのものにおいて、前記第一の冷媒がクロ

ロフルオロカーボン系冷媒またはハイドロクロロフルオロカーボン系冷媒で、前記第一の潤滑油が鉱油であり、前記第二の冷媒としてハイドロフルオロカーボン系冷媒を用い、前記第二の潤滑油としてエステル油またはエーテル油を用いるものでり、エステル油またはエーテル油がＨＦＣ系冷媒に相溶性であるため、二相分離させて鉱油を潤滑油蓄積機構へ蓄積できるだけでなく、極性の差を利用して活性炭にて鉱油を蓄積でき、さらに分子量の差を利用して分離膜により分離して蓄積できるため、様々なバリエーション、組み合わせでの分離・蓄積が可能である。

【００５８】また、請求項９～１１のいずれかに記載の発明による冷凍サイクル装置の運転方法は、第一の冷媒と第一の潤滑油を用いた冷凍サイクル装置に使用していた延長配管及び／又は利用側機を、第二の冷媒と第二の潤滑油を用いた冷凍サイクル装置の延長配管及び／又は利用側機として用い、冷凍サイクル運転を実施しながら、前記延長配管及び／又は利用側機に残留した前記第一の潤滑油を連続的に冷媒回路内の一部に蓄積するので、既設配管及び／又は利用側機を利用可能としたため、低コストで既設配管及び／又は利用側機が再利用でき、冷凍サイクル装置のリニューアルが可能となる。

【図面の簡単な説明】

【図１】　この発明の実施の形態１による冷凍サイクル装置の冷媒回路を示す図。

【図２】　この発明の実施の形態１の潤滑油蓄積手段を示した図。

＊【図３】　この発明の実施の形態２の潤滑油蓄積手段を示した図。

【図４】　この発明の実施の形態３の潤滑油蓄積手段を示した図。

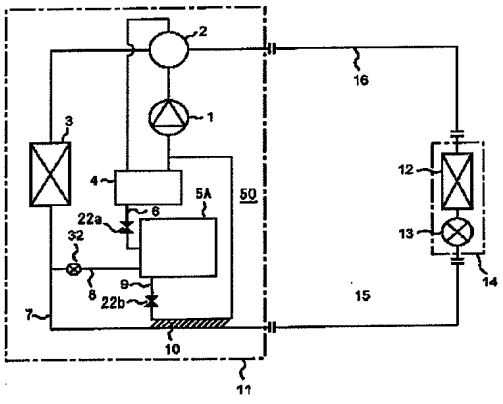
【図５】　従来の冷凍サイクル装置の冷媒回路を示す図。

【図６】　従来例のレトロフィットによる既設配管の利用方法を示す図。

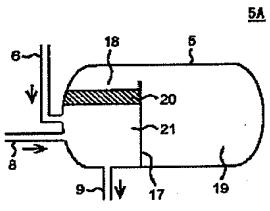
【符号の説明】

１　圧縮機、　２　四方弁、　３　熱源側熱交換器、　４　アキュムレータ、５Ａ，５Ｂ，５Ｃ　潤滑油蓄積手段、　５　処理槽、　６　連結管、　７　液管、　８　連結管、　９　流出管、　１０　冷媒熱交換器、　１１　室外機、１２　利用側熱交換器、　１３　流量調整器、　１４　利用側機、　１５　液延長配管、　１６　ガス延長配管、　１７　仕切り板、　１８　分離領域、　１９蓄積領域、　２０　上相、　２１　下相、　２２ａ，２２ｂ 弁、　２３　活性炭、　２４　フィルタ、　２５　フィルタ、　２６　空間、　２７　空間、２８　分離膜、　２９　空間、　３０　蓄積領域、　３１　ヒーター、　３２流量調整器、　３３　圧縮機、　３４　四方弁、　３５　熱源側熱交換器、　３６　第１の操作弁、　３７　第２の操作弁、　３８　アキュムレータ、　３８ａ返油穴、　３９　流量調整器、　４０　利用側熱交換器、　５０　潤滑油蓄積機構、　Ａ　熱源機、　Ｂ　利用側機、　Ｃ　第１の接続配管、　Ｄ　第２の接続配管。

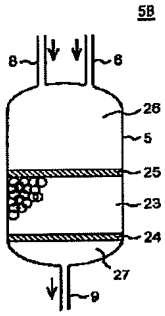
【図１】



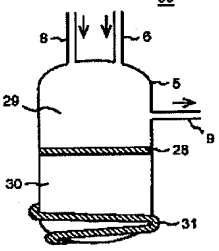
【図２】



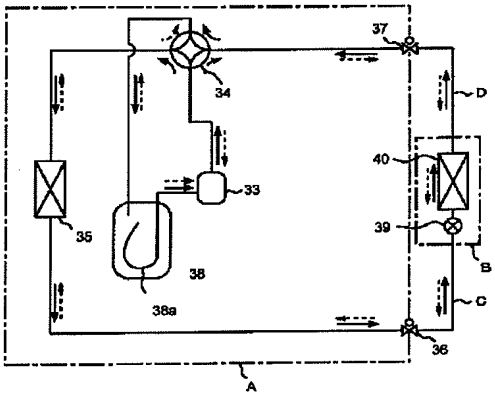
【図３】



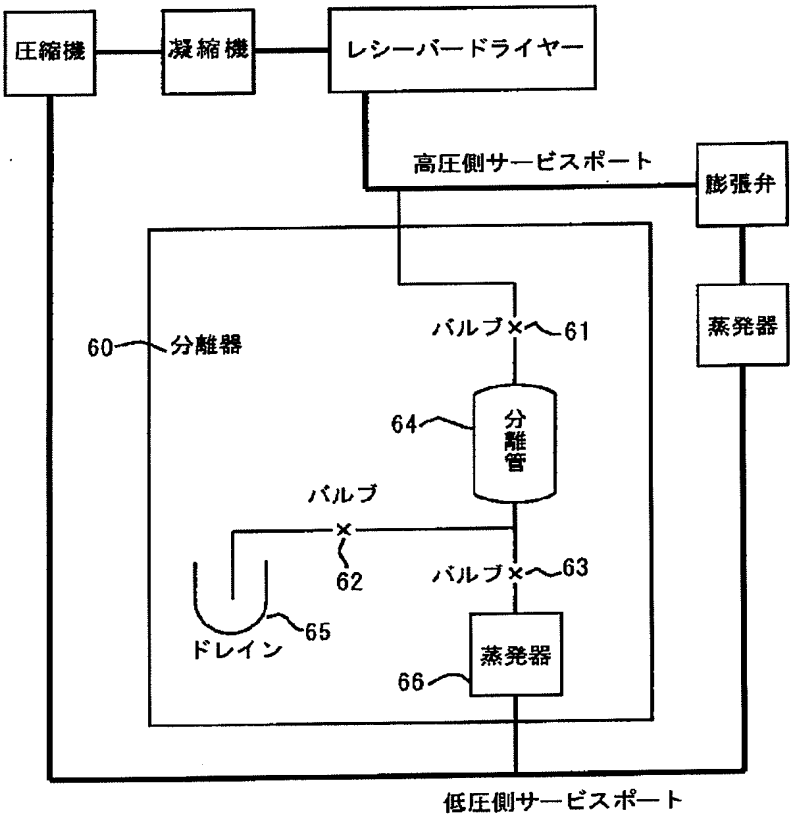
【図４】



【図５】



【図６】



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